Frank Elling, President, Quintech Electronics and Communications

Quintech Electronics & Communications, Inc. was founded in 1989 and incorporated that same year in Indiana, Pennsylvania. The company is a state-of-the-art designer and manufacturer of RF signal management communications equipment and globally distributed.

Its products are vital and necessary for RF signal management and are the keystones to the automation of today's advanced telecommunication network infrastructures and test laboratories. Its worldwide customers include satellite, government, wireless telecommunications, broadcast and CATV service and equipment providers. Quintech produces RF matrix switches, redundancy switches, relay switches, splitters, combiners, amplifiers, frequency converters and DC powering products. The products are available in wireless, L-band, IF, and broadband frequencies. These RF signal management products are used for test and measurement, monitor and control, signal replication, backup and protection, and legal surveillance. Designed for high reliability and maximized uptime, the company has products in active service for over 25 years. Quintech has historically emphasized the design and development of customer driven RF signal management solutions in order to provide the best possible result for its customers.

GMC Q&A

RF performance and reliability

Quintech Electronics & Communications, Inc. (Quintech) has succeeded for more than thirty years providing world class products and services to domestic and international customers. Quintech products are deployed in over 120 countries. Working within the analog RF discipline of telephony, cable/HFC, wireless, broadcast and satellite systems, Quintech is one of the leading providers of RF signal management products and solutions worldwide. The company designs and manufactures a variety of products including RF matrix switches, redundancy switches, relay switches, splitters, combiners, amplifiers, DC powering products and test automation and control software. Quintech products enable its customers to bridge the gaps which continue to exist between converging broadband transmission, reception and transport technologies. Amy Saunders spoke with Quintech's President, Frank Elling, to find out about the company's market presence, capabilities, and expectations for the future.

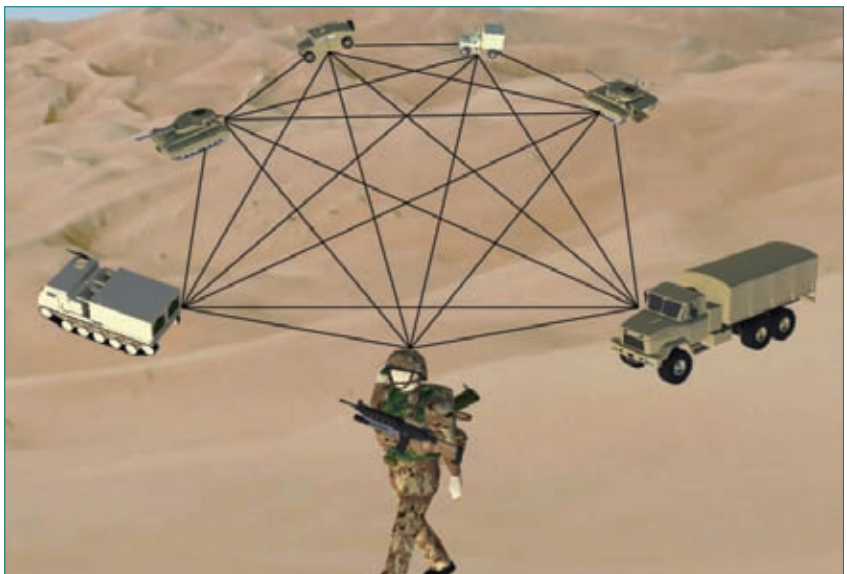
GMC: Can you provide an overview of Quintech's development, from its founding to its position in the market today?

Frank Elling: Quintech invented and patented its first RF matrix switch in 1996, as an automated patch panel with integrated splitting capabilities. Early customers such as ESPN, Turner Broadcasting and Globecomm employed our switches for Network Operations Center infrastructure. In addition to our industry-first patented L-band RF Matrix Switch, other notable Quintech inventions and industry firsts include the first three-stage L-band Matrix and first patented frequency stacker. In addition, Quintech designed the first rack-mount redundant power supply for LNB powering and the first rackmount L-band splitter and combiner in the industry.

Quintech has achieved an impeccable reputation for RF performance and reliability required for today's telecommunications infrastructures. Building on our success, we will continue to thrive and meet the necessities of today and the challenges of tomorrow. The drivers of convergence are the same today as they always have been. The world becomes a closer place due to the growth and offerings of new and different technologies that will shape and form the immensely diverse telecosm that lies ahead. Quintech's unique opportunities are based on the premise that preferred RF platforms are essentially wireless. RF is Quintech's core expertise, and RF is the only way to transport over air communications.

GMC: What can you tell us about your products, and how they compare to others available on the market?

Frank Elling: Quintech designs and manufactures the world's largest configuration L-band matrix switching systems. The patented XTREME 256 is a



Mesh Networks. Photo courtesy of Quintech

disruptive technology that has defined the next generation L-band matrix switch. Advanced RF design and power management methods allow the XTREME 256 to achieve industry leading gain flatness and linearity for maximum RF performance while cutting power consumption by up to 80 percent. The system brings expansion by reduction by allowing the user to minimize rack space requirements with highly scalable packaging. The switch features a patented flexible matrix architecture that supports a variety of large symmetric e.g. 128x128 and industry exclusive asymmetric configurations e.g. 48x208, 64x192, 160x96 in a single 12 RU chassis. The XTREME 256 also supports multi-chassis configurations up to 2048x2048.

In the satellite, government and military space, Quintech designs and manufactures matrices of which thousands are deployed worldwide. These L-band matrices and ancillary products offer Network Operations Centers (NOCs), teleports, Earth stations, IP and cable headends the ability to dramatically expand reliable operational capabilities.

Question: Which market segments are key to Quintech's business, and how have they changed over the years?

Frank Elling: Our products are used by a wide variety of telecommunications customers including commercial satellite broadcast, government and military satellite Earth stations, wireless test and measurement laboratories and cable/HFC networks. Our products have typically been developed for the CATV, L-band, and wireless frequency ranges spanning from return path 5MHz to WiFi 6GHz. In addition to the standard product line, Quintech also works with customers to develop custom products to meet special RF design requirements.

Our customer list is a 'who's who' of almost every tier-one player in their respective industries. Our products are part of the global communications backbone. In satellite and cable, the growth in channels and transponder capacity has driven demand for our matrix switches for greater signal management capabilities. The flexibility and modularity of our RF matrices, combined with superior performance, reduced power consumption and physical footprint help operators minimize operating costs and overhead.

Quintech's NEXUS family of wireless test lab equipment and software emulate free space in a controlled environment, which is essential to testing wireless network equipment, including base stations, antennas, and user terminals. Our proprietary Q-LAAMP® laboratory automation management software provides the test laboratory with the ability for a large number of individual users to run tests simultaneously. In mobile communications, the bandwidth and amount of content that needs to be delivered to mobile hand-held devices and radios, in both military and civil applications has proliferated in recent years. In the US wireless sector, carriers such as AT&T, Verizon, and Sprint, as well as military wireless network and equipment suppliers need to efficiently test and validate the ever-changing wireless handsets, protocols, and radio or air interfaces and waveforms. LEO and MEO satellite constellations designed for mobile communications have similar network requirements.

Full mesh network

Question: Where do you see the greatest market opportunities going forward?

Frank Elling: New satellite technologies that have been introduced in recent years such as high throughput satellite (HTS) proliferate as the industry utilizes lower orbits and smaller satellites in larger constellations for massive data transmission, improved latency and cellular backhaul purposes. These HTS platforms utilize spot beams and frequency reuse to provide significantly more capacity than traditional satellites. Worldwide satellite Earth stations primarily operate using down-converted L-band and IF-band frequencies. Employing L-band matrix switches for the up and down link paths allow for the dynamic routing of signals between different gateway antennas and for dynamic allocation of bandwidth to specific spot beams.

Satellite broadband services continue to deploy infrastructure in teleports and to remote corners of the globe. We see continued growth in the need for our reliable RF matrices that include large configuration systems for C4ISR purposes such as military teleport, special surveillance sites and network operation centers.

On the mobile side, wireless networks continue to increase bandwidth and add devices, from handhelds to tablets to Internet of Things (IoT) devices. Tactical radio networks face the increased complexities of testing and validating RF base stations and devices for civil and military applications. These can range from fixed mobile to vehicle-to-vehicle which creates mesh networks. Our NEXUS family of RF matrices for wireless test labs fills a need driven by these applications.

Question: What trends are you seeing right now in the government and military markets that might affect your business, and how will Quintech adapt?

Frank Elling: Modernization and refitting legacy Earth station communication platforms offers Quintech the opportunity to provide the customer with state-of-the-art and reliable signal management products to meet their demanding and specific requirements. For example, Electronic Warfare (EW) and monitoring of worldwide telecommunications are utilized extensively by allied intelligence agencies to gather and share intercepted and monitored signals for anti-terrorist and cyber security purposes. The QE3 and XTREME L-band matrices are deployed worldwide by intelligence organizations for these operations. Quintech's latest RF signal management systems technology, the XTREME 256 matrix, is designed specifically for the continued evolution of these worldwide deployments. Modernization of US and worldwide government legacy communications infrastructures need to be keyed to today's modern Earth station requirements. Presently, the US has implemented programs to modernize and upgrade to new standards, existing Earth stations around the globe.

New satellite platforms for communications deploy more complex payloads, spot beams, and switching, making them increasingly complex and 'cellular-like' so we see potential for RF test automation solutions on the terminal side, and possibly elsewhere. Wireless Mesh Networking and Software Defined Radio (SDR) are applications we see that requires complex RF test lab solutions, and customers are using our NEXUS and Q-LAAMP solution to test and validate military wireless mesh systems.

Question: With software defined radio (SDR) becoming increasingly popular within military groups the world over, how far do you think the technology could possibly develop? What are the limits?

Frank Elling: We believe that SDR technology can bring huge gains in flexibility, performance, and cost savings for radio, and satellite systems and terminals, and we've seen market research projects for 12 percent growth through 2021. But key challenges to market expansion, according to some analysts, are development and integration. SDR technology expands the capabilities of existing communication systems by allowing ad hoc networks that can grow or shrink, and include redundancy paths for greater resiliency. Traditional fixed networks required costly upgrades to change network configurations and limited redundancy.

With increased dependence on SW and FW, the equipment requires costly and time intensive regression testing to ensure that the SW and FW can work on multiple configurations that can change in the field. Quintech helps address these development cost and integration challenges by reducing RF test costs and accelerating schedules with Quintech's RF and Wireless Test solutions. Engineers have found they can achieve dramatically reduced test schedules and increase accuracy in RF link testing for mesh networks by using new advanced RF matrix switch test and measurement systems from Quintech.

Quintech's NEXUS RF matrix switches and Laboratory Automation and Management Platform, Q-LAAMP software solutions can dramatically increase wireless test lab efficiency. To test and validate new architectures and networks, designers and engineers require test systems that can be easily configured and controlled to create and test scenarios that emulate free space in a controlled environment, which is exactly what NEXUS offers.

GMC: Cybersecurity is becoming ever more important within the wireless communications sphere, particularly within government and military fields. What steps do you think need to be taken to ensure communications remain secure?

Frank Elling: Quintech's expertise and products are focused on the hardware equipment used to route the RF communications signals. We are seeing the industry move toward SDR that allow public safety officers to switch to non-commercial channels to stay in communication while they jam the commercial signals. SDRs are also being deployed in the low Earth orbit (LEO) satellite constellations, which includes mesh/beam-hopping, or satellite-to-satellite, communications. The use of SDRs and beam-hopping results in a more secure communications network as the number of access points to the RF signals are reduced.

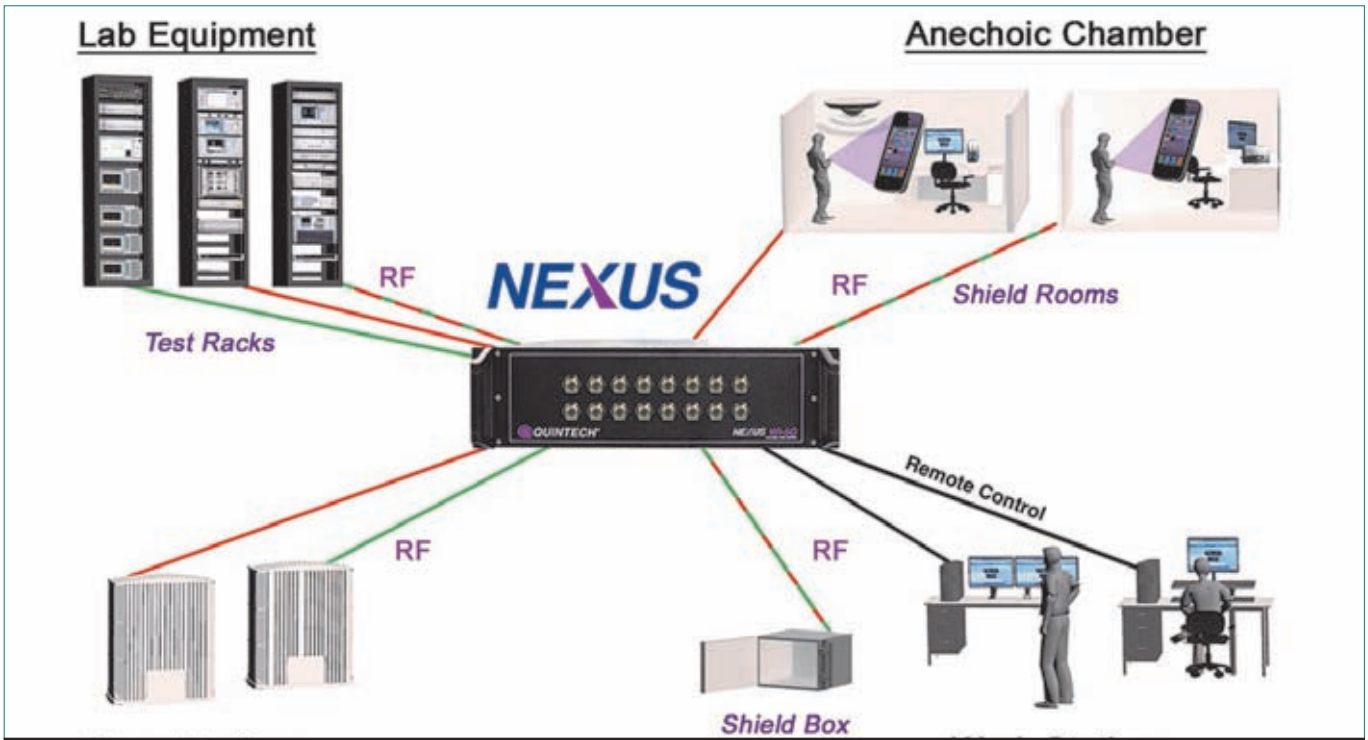
Successful deployment of this new technology is important for creating more secure networks. Quintech provides a NEXUS mesh matrix switch that is used by equipment manufacturers to speed up their development cycles and allow them to test a large number of network configurations to ensure the resiliency of the hardware and software.

GMC: What do you expect Quintech to achieve in 2018?

Frank Elling: Quintech expects 2018 to be a breakout year for several of our existing and soon to be released products. With industry emphasis on size, weight and power (SWAP), and the need to improve cyber security industry wide, Quintech's products will see increased use to help solve these issues. Quintech has used the last three years to improve not only SWAP, but also enhanced controls and additional features. One of these features allows the user to adjust gain and attenuation at the inputs and outputs to software define certain RF specifications to optimize what is most important for the customer's application. The Built-In Self-Test (BIST) and 'smart' control will tell the user exactly what the performance of certain specifications are, e.g. noise figure, P1dB and gain.

Quintech sees several opportunities that have been developing over years will come to fruition in 2018. Due to the increased demand for data, launching of LEO, MEO and GEO satellites will proliferate and cause the increased need for satellite Earth stations for uplink, downlink and tracking, telemetry and control.

Quintech is excited and looking forward to supporting our customers with their RF signal management requirements in 2018. Quintech products are used extensively in commercial and government platforms for a multitude of functions. We will continue to view our role in the telecommunications industry as one of opportunity to provide world class product solutions for our worldwide customer base. **GMC**



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